INVESTOR IN PEOPLE

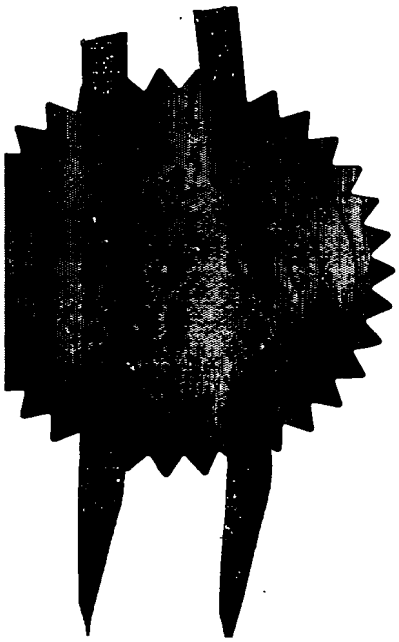
The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

In accordance with the rules, the words "public limited company" may be replaced by p.l.c., plc, P.L.C. or PLC.

Re-registration under the Companies Act does not constitute a new legal entity but merely subjects the company to certain additional company law rules.



Signed 

Dated 5 October 2005

GB0419485.8

By virtue of a direction under Section 32 of the patents Act 1977, the application is proceeding in the name of,

XAMOL LTD,
MISSION WORKS,
BIRDS ROYD LANE,
BRIGHOUSE,
W.YORKSHIRE,
HD6 1LQ,
United Kingdom

[ADP No. 09015645001]

THE PATENT OFFICE
CD
- 2 SEP 2004
RECEIVED BY FAX

Patents Form 1/77

Patents Act 1977
(Rule 16)

The Patent Office

025EP04 E923187-1 D00346
P01/7700 0.00-0419485.8 ACCOUNT CHA

The Patent Office

Cardiff Road
Newport
South Wales
NP10 8QQ

Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

1. Your reference — GW-MK-G35816

2. Patent application number *(The Patent Office will fill in this part)* — 02 SEP 2004 — 0419485.8

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

   Alco Valves Ltd
   Mission Works
   Birds Royd Lane
   Brighouse
   West Yorkshire
   HD6 1LQ

   Patents ADP number *(if you know it)* 06899355001

   If the applicant is a corporate body, give the country/state of its incorporation — United Kingdom

SECTION 30 (1) RETAINED FOR PUBLICATION FILED 22/12/04

4. Title of the invention — Improvements to Valve

5. Name of your agent *(if you have one)*

   "Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

   Bailey Welsh & Co
   5 York Place
   Leeds
   LS1 2SD

   Patents ADP number *(if you know it)* — 224001 ✓

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*
   a) any applicant named in part 3 is not an inventor, or
   b) there is an inventor who is not named as an applicant, or
   c) any named applicant is a corporate body.
   See note (d)) — Yes

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	11
Claim(s)	
Abstract	
Drawing(s)	10

10. If you are also filing any of the following, state how many against each item.

Priority documents	
Translations of priority documents	
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	
Request for preliminary examination and search *(Patents Form 9/77)*	
Request for substantive examination *(Patents Form 10/77)*	
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature [signature] Date 2nd September 2004

12. Name and daytime telephone number of person to contact in the United Kingdom

G WOOD
0113 243 3824

Warning

After an application for a patent has been filed, the Comptroller of the Patent Office will consider whether publication or communication of the invention should be prohibited or restricted under Section 22 of the Patents Act 1977. You will be informed if it is necessary to prohibit or restrict your invention in this way. Furthermore, if you live in the United Kingdom, Section 23 of the Patents Act 1977 stops you from applying for a patent abroad without first getting written permission from the Patent Office unless an application has been filed at least 6 weeks beforehand in the United Kingdom for a patent for the same invention and either no direction prohibiting publication or communication has been given, or any such direction has been revoked.

Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 08459 500505.

b) Write your answers in capital letters using black ink or you may type them.

c) If there is not enough space for all the relevant details on any part of this form, please continue on a separate sheet of paper and write "see continuation sheet" in the relevant part(s). Any continuation sheet should be attached to this form.

d) If you have answered 'Yes' Patents Form 7/77 will need to be filed.

e) Once you have filled in the form you must remember to sign and date it.

f) For details of the fee and ways to pay please contact the Patent Office.

Valve

The invention which is the subject of this application relates to a valve and improvements to the same which allow the same to operate in an improved manner.

There are many different forms of valve which are provided for use in specific operating environments and to provide particular operational requirements.

One known type of valve is the double block & bleed valve (DBB's) which are now commonly used in the processing industries.

There are several versions of DBB valves currently available, with each version typically having features that enhance use, performance or safety.

One form of DBB valve is the ball valve version. In this version there are provided first and second common ball valves which are assembled side by side and inline. An intervening bleed valve is provided between the two ball valves which provides the term double block (two ball valves) and Bleed, DBB.

The common ball valves which are used typically are generally available in two design types, the floating ball or trunnion mounted type. These two types of ball valve work in quite different ways to produce an effective seal against a pressurised process medium.

The floating ball type has static seats and a ball which is movable under the influence of pressure being applied to one side of the floating ball such that the ball contained within the valve is pushed toward a static seat downstream of the ball to

make a pressure tight seal. The disadvantage with this design is that as the pressure is applied, the ball moves toward the downstream seat and as it moves it releases the compression on the static upstream seat. This therefore means that the pressurised medium can then pass through the upstream seat due to lack of compression and it fills the ball cavity. This therefore means that at any given time in practical operation only one seat is performing the sealing operation and this is the static seat downstream of the fluid which is applying the pressure on the ball. Thus, should the downstream seat fail there is no further seat to prevent leakage/failure.

The trunnion mounted ball design has a static ball and dynamically movable seats. In this case if pressure is applied to one side of the trunnion mounted ball valve, the ball contained within remains static and the upstream seat is pushed toward the static ball to make a pressure tight seal. The disadvantage with this design is that if the upstream seat fails the downstream seat would be pressurised by the fluid and be pushed in the wrong direction away from the ball and leakage/failure occurs.

Due to the inherent single barrier offered by these common ball valve designs the use of DBB valves has become popular as they offer two barriers in one common valve assembly.

The aim of the present invention is to provide further improvements to the operation of valves and to provide a double sealing action within the valve.

In a first aspect of the invention there is provided a valve, said valve having a ball and first and second sealing means against which the ball is selectively positioned to provide a sealing effect when the valve is in a closed position and wherein the first and second sealing means provide a sealing effect with

respect to said ball when under the influence of a pressurised fluid.

In one embodiment the sealing means or seats provide a seal against opposing sides of the ball, typically the upstream and downstream sides of the ball.

Typically the ball has a port passing therethrough, said ball rotatable with respect to the valve body to be movable between an open position in which the port is in line with the pipeline to which the valve is connected and a closed condition in which the openings in to the port are sealed off from the pipeline by the sealing means.

In one embodiment the common pressure source is the fluid passing along a pipeline on which the valve is fitted.

In one embodiment the ball which is used is a modification of the ball of the type used in a floating ball valve design and the first and second sealing means which are used are modified pressure dynamic seats of the type used in a trunnion mounted ball valve design such that in a previously unknown manner the sealing means and the ball are all movable with respect to the valve body to create the sealing effect.

In one embodiment both upstream and downstream sealing means or seats can be made to work simultaneously under one pressure source from one direction.

In accordance with the invention there is provided a valve with one ball and two sealing means acting as pressure barriers thus allowing a compact valve to be provided with a single ball element that offers double block/pressure barrier isolation

capability. This in turn provides advantages in terms of size and cost.

In one embodiment two of the valves in accordance with the invention are mounted in line to provide a two ball element valve that has quadruple block/pressure barrier isolation capability for extra safety and reliability.

In one embodiment the valve can include an intervening bleed valve and/or intervening port/s for sensing instruments, probes, sampling/process removal or injection/introduction equipment.

All embodiments can be fitted with other intervening devices between the seats or valves.

In a further aspect of the invention the ball of the valve as herein described is provided with a valve which allows the downstream side of the valve to be vented.

In operation, once the cavity in which the ball is mounted has a fluid pressure drop due to the occurrence of venting of the valve upstream, the downstream pressure is greater than that in the cavity and pushes the valve open which allows communication with the downstream side of the valve and allows the venting of the downstream side of the valve.

In one embodiment, at least one pressure sensor is provided in the cavity in which the ball in the valve sits. The pressure sensor can be provided to detect change in pressure of the fluid in the cavity. An increase in pressure of the fluid in the cavity indicating failure of the seal upstream of the ball. However, as, in accordance with the invention, there is provided a seal downstream of the ball in addition to that upstream of the ball, so the valve will still operate but the change in pressure can be

used as an indicator that the upstream valve seal is required to be replaced and can be done prior to the valve itself failing.

In a further embodiment, the ball is capable of movement within the cavity of the valve and the sealing means upstream of the ball is capable of limited movement to and from said ball. In turn, the ball, with the upstream sealing means in engagement therewith, is movable under the influence of the pressurised fluid onto the sealing means downstream of the ball which in turn is moveable to a limited extent in the valve. Thus, the sealing relationship within the valve is formed between the seal upstream which is movable, the ball which is movable and the seal downstream which is movable such that the sealing effect can be created between the ball and the upstream and downstream seals.

In one embodiment, the sealing means upstream of the ball is provided with mechanical advantage such that the effect of the pressurised fluid on the first face of the seal generates an increased pressure at the sealing face between the sealing means and the ball.

Typically, the allowable movement of the first and second seals in the valve is less than that for the sealing means in the conventional ball valve arrangements.

In one embodiment of the invention, as the ball is capable of movement within the cavity of the valve, the stem which is provided to allow rotation of the ball between open and closed positions, is provided with engagement means on said ball to allow movement of the ball to be achieved but still allow operation of the ball between open and closed positions by movement of the stem.

In a further embodiment, there are provided double sealing arrangements within the stem, ends and seats of the valve so as to provide improved safety.

Specific embodiments of the invention are now described as reference to the accompanying drawings wherein:-

Figure 1 illustrates prior art ball valve systems,

Figures 2a and b illustrate a first embodiment of the invention in section,

Figures 3a and b illustrate a second embodiment of the invention in section,

Figures 4a-c illustrate a further embodiment of the invention,

Figures 5a-c illustrate a yet further embodiment of the invention,

Figures 6a-c illustrate a yet further embodiment of the invention.

Figures 7a-c illustrate a further embodiment of the invention,

Figure 8a-c illustrate a further embodiment of the invention,

Figure 9a-c illustrate a further embodiment of the invention, and

Figure 10 illustrates a further embodiment of the invention.

Referring firstly to figure 1 there is illustrated two prior art ball valve sealing systems. In the first system, referred to as a floating ball sealing system, there is provided a ball (a) mounted in the valve cavity, not shown, and in the figure 1a there is shown the ball (a) with an upstream seal b and downstream seal

c in the normal conditions in ambient pressure. However, when a liquid flows along the pipeline to which the valve is connected, as indicated by arrows (d) so pressure is applied to the ball (a) as indicated by the arrows (d). As the ball effectively floats within the cavity of the valve, the ball is moved as indicated by arrows (e) towards the downstream seal (c) so that an effective seal at portion (f) is achieved. However, if this seal (f) fails then there is no longer any other seal in the ball and the valve such that the fluid can then flow through the seal and the valve is ineffective.

Referring to figures 1c and d there is illustrated an alternative ball valve arrangement wherein the ball (a) is again provided with downstream seal (b) and upstream seal (c). However, in this arrangement, the ball is fixed in position and when fluid pressure is applied to the upstream seal (b) as indicated by arrows (d) then the upstream seal (b) moves as indicated by arrows (e) against the ball to form the effective seal at portion (f).

In this case, if the seal at f is broken then the fluid can enter the cavity in which the ball is mounted and then force the downstream seal c away from the ball as indicated by arrows g so that the valve leaks.

Turning now to figures 2a and b there is illustrated a first embodiment of the invention which is shown in section along the longitudinal centre line of the valve body and shows the valve in a closed position in figure 2a and an open position as shown in Figure 2b with the fluid flowing through the valve as indicated by arrow 2. The valve comprises a valve body 4 a valve stem and handle arrangement 6, 8 respectively which is connected to operate the ball 10 and allow the same to be rotated in the cavity 12 between the closed position in which the fluid is prevented from passing through the cavity in the valve

and an open position in which the fluid can pass through the aperture in the ball and along the pipeline as shown in figure 2b.

Provided in location in the valve are an upstream sealing means 14 and the downstream sealing means 16. The valve includes a number of other components provided to locate the various components in position but these components are largely conventional and therefore will not be described.

In the open position, the upstream and downstream sealing means 14, and 16 are not providing a closing seal. When the valve is in the closed position shown in figure 2a, the pressure of the fluid entering the valve in the direction indicated by arrow 2, causes the upstream sealing means 14 to move towards the ball as indicated by arrow 16. This movement creates a seal between the sealing means and the ball at the portion 18. In accordance with the invention, the movement of the sealing means against the ball is provided to have a mechanical advantage in that the seal created is at a greater pressure than the pressure of fluid acting on the sealing means 14. Furthermore, the sealing means 14 is capable of moving to a limited degree along the portion 20 of the valve body and is provided with piston seals 22 around the same. In accordance with the invention, the ball 10 is moveable within the cavity and therefore once the force of the sealing means on the ball has reached a certain pressure the sealing means 14 acts to move the ball 10 in the direction of arrow 24 within the cavity whilst maintaining the seal between the upstream sealing means 14 and the ball at portion 18.

The movement of the ball 10 in the direction of arrows 24 causes the same to contact with the downstream sealing means 16 and provide a seal at portion 26. The downstream sealing means 16 is also moveable to a limited extent within the portion

28 as indicated by arrow 30. Thus, in accordance with the invention, there is provided a first sealing arrangement upstream of the ball and a second sealing arrangement downstream of the ball with both first and second seals being effective such that should a first seal fail then the other seal can still be maintained. The provision of the movement of the upstream sealing means 14 onto the ball and then the movement of the ball 10 onto the downstream sealing mean 16 with the upstream sealing means following the ball is unique and provides distinctive advantages firstly, that there is provided a double seal arrangement in a valve body which only requires one valve ball arrangement. This reduces the cost of the manufacturer of the valve and significantly reduces the length of the valve itself whilst assuring that a double block or seal is achievable.

Further advantages can be obtained as will now be described with reference to the further drawings which show further embodiments of the invention and uses similar components to those shown in figures 2a and b. For this reason, only new features will be provided with reference means in these drawings.

Figures 3a and b, show the provision of the valve with a cavity port 32 which allows access to be gained to the cavity through the port as required.

Figures 4a – c illustrate a valve arrangement in which there is provided a port 34 which allows the cavity 12 in which the ball is mounted to be accessed and purged of liquid. Furthermore, this valve is bidirectional in that it can be fitted either way round into the pipeline.

Figures 5a-c illustrate a further arrangement wherein the valve is again provided with a cavity port 34 to allow purging of the cavity and a downstream port 36 which allows the downstream

part of the valve 38 to be purged or bled when the valve is in a closed position. In this arrangement the cavity and the downstream part of the valve to be purged are such that the position of the valve with respect to the pipeline can be reversed so that the cavity 12 and the upstream part of the valve can be purged.

Figures 6a-c illustrate a unique feature of the current invention wherein there is provided the port for access to the cavity 34 to allow the cavity to be purged and also, in accordance with this embodiment, the port, 34 can be used to purge the downstream portion 38 of the valve. This is achievable via the port 34 as there is provided a check or non return valve 40 in the wall of the ball. Thus, when the ball is in the closed position, as shown in figure 6a, the valve 34 can be operated to purge the cavity 12 of liquid. Once this is achieved, the pressure differential between the cavity 12 and downstream portion 38 are such that the pressure in the downstream portion 38 causes the valve 40 to open thereby connecting the downstream portion 38 to the cavity 12 and causing the flow of liquid from 38 into the cavity 12 and through the port 34 and allows the same to be purged via port 34.

Figures 7a-c illustrate yet a further embodiment wherein there is provided a bleed port 34.

Figures 8a-c illustrate a yet further embodiment of the valve wherein is provided a pressure sensor 50 which is provided to detect the pressure of fluid within the cavity 12 and, as previously indicated, if the pressure of fluid within cavity 12 is found to increase significantly, then this is indicative of failure of the seal 18 between the upstream sealing means and the ball as fluid is able to enter the cavity 12 past the seal 18 when in the closed position shown in figure 8a. In accordance with the

invention this failure is not complete as the seal between the downstream sealing means 16 and the ball 10 is maintained so that fluid can still not enter the downstream portion 38. However, the increase in pressure can be indicated to an operator of the valve system who would then repair the upstream sealing means 14 to ensure that the repair is made before the valve fails completely.

Figure 9a-c illustrate a further embodiment wherein there is provided a purge valve 60 both upstream and downstream of the ball 10 to allow the upstream portion 62 and downstream portion 38 to be purged separately as required.

Figure 10 indicates a further embodiment of invention wherein there is provided an in line ball valve arrangement in accordance with the invention with, in this embodiment, two in line ball valve arrangements. The ball valve 10' is shown in a closed configuration and the upstream ball valve configuration 10 is shown in an open position thereby allowing the flow of liquid to the bleed port 34 to allow purging of the portion of the valve upstream from the ball 10'.

TYPICAL

FLOATING BALL

SEALING SYSTEM

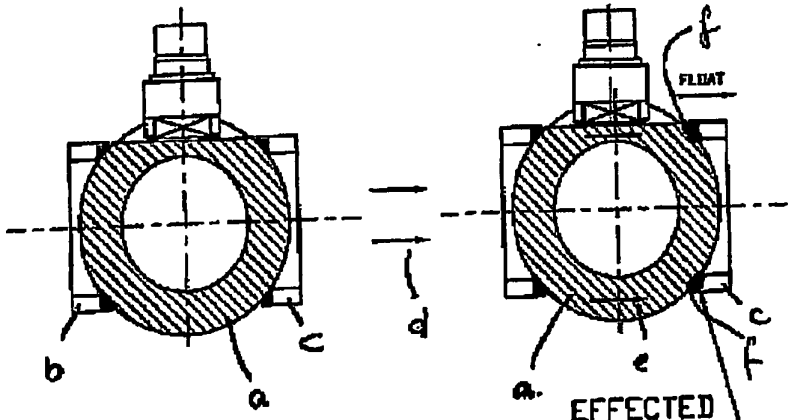


Fig 1a

CLOSED POSITION

Fig 1b

AMBIENT PRESSURE

AT PRESSURE

Figure 1

TYPICAL

TRUNNION MOUNTED BALL

SEALING SYSTEM

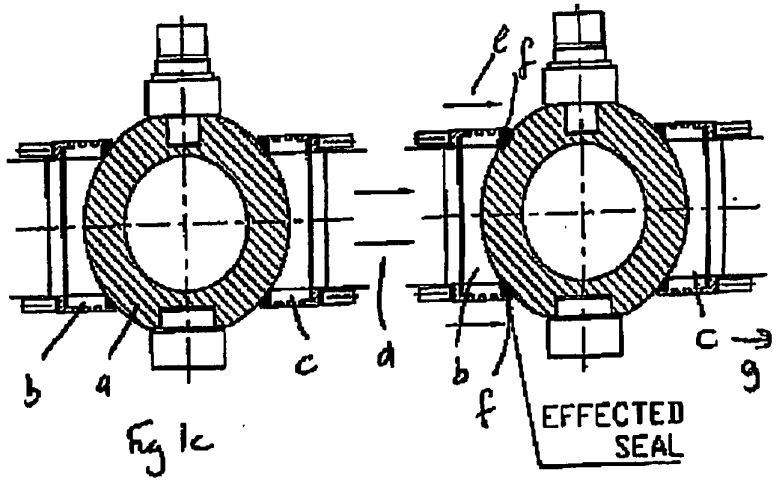


Fig 1c

CLOSED POSITION

Fig 1d.

AMBIENT PRESSURE

AT PRESSURE

COPYRIGHT ALCO VALVES LTD
© 2004

0115767 02-Sep-04 05:45:

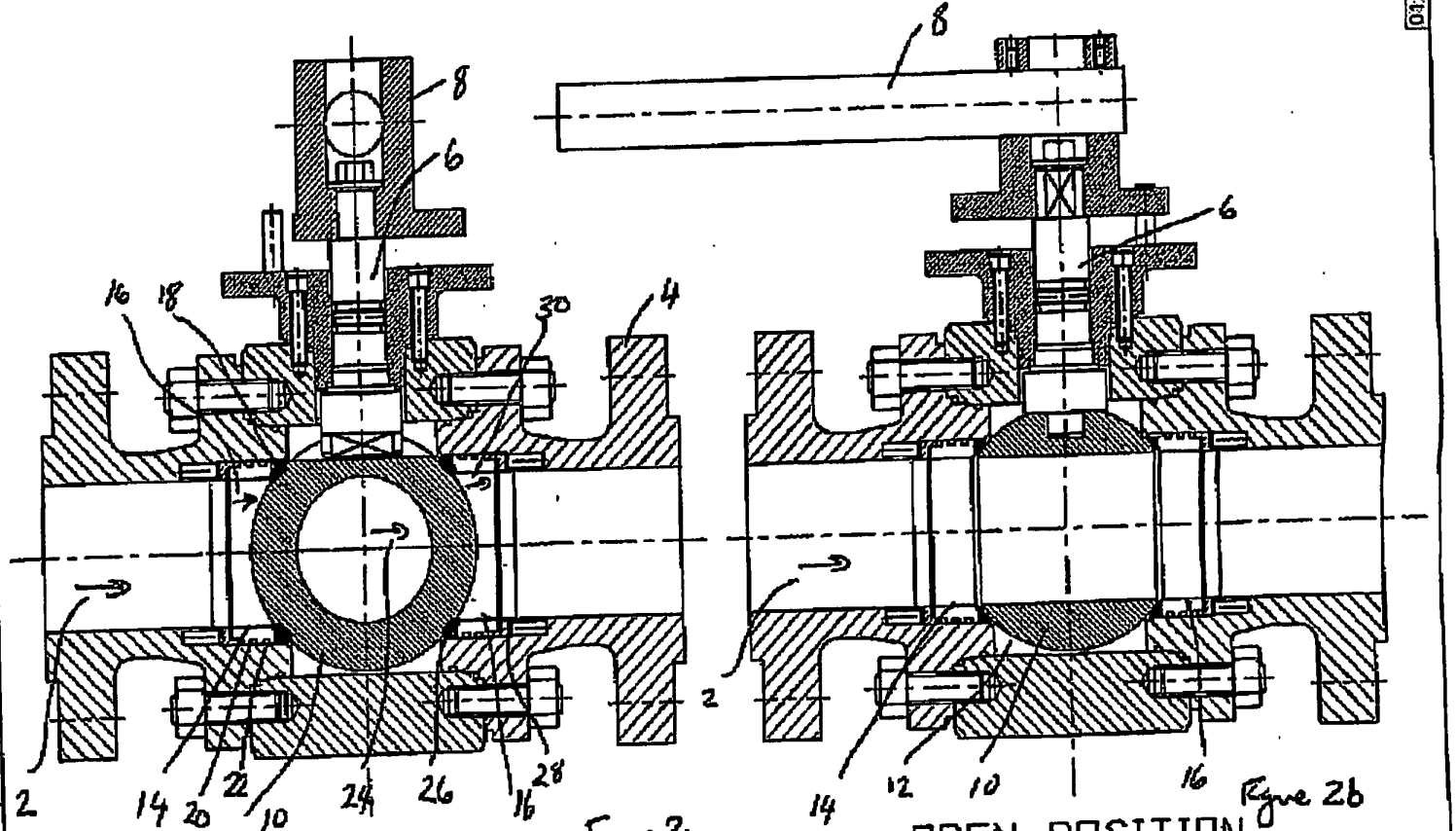
02/09/2004 16:13 BAILEY WALSH & CO 7 0700000000

PART NUMBERING MATERIAL CODING	THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY	CONFIDENTIAL	REMOVE ALL SHARP EDGES AND BURRS ☑	DIMENSIONS SHOWN ARE METRIC ☑ IMP ☐
			OUR PURCHASE ORDER No	

PART NUMBER	MATERIAL SPECIFICATION ✓		ITEM No
	BS970 GRADE 220M07 e/t.		
	BS2874 GRADE CZ121-BRASS		
	BS970 GRADE 316 S 11		
	BS970 GRADE 416 S 21.		
	MONEL 400.		
	INCOLOY 825.		
	ALI-BRONZE NES 833		
	HASTALLOY		
	CUPRO-NICKEL		

REVISIONS ⊕ 3rd angle

REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	24/08/04	ISSUED	I.D.



PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

[redacted]ISIONS AND DESIGNS ARE [redacted]JECT TO CHANGE WITHOUT PRIOR NOTICE.

CERTIFICATION REQUIRED
BS EN 10204:(LATEST REVISION)
ORIGINAL MILL CERTIFICATE
N.A.C.E. MR. 01.75(LATEST REVISION)
ADDITIONAL:-

Alco Valves
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713009 Int'l: ++44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE	SCALE N.T.S.
PROPOSED PISTON SEAT FLOATING BALL	DATE 24/08/04
DRAWING NUMBER / DRAWN DAC	CHECKED
REVISION No 1	

02/09/2004 16:13 BAILEY WALSH & CO → 01633814444 PAGE 002
0415767 02-Sep-04 05:45

THIS DRAWING IS SUBJECT TO 'COPYRIGHT'
IT CANNOT BE COPIED OR REPRODUCED WITHOUT
THE WRITTEN AUTHORITY OF THE COMPANY

CONFIDENTIAL

REMOVE ALL SHARP EDGES AND BURRS ☑

OUR PURCHASE ORDER No

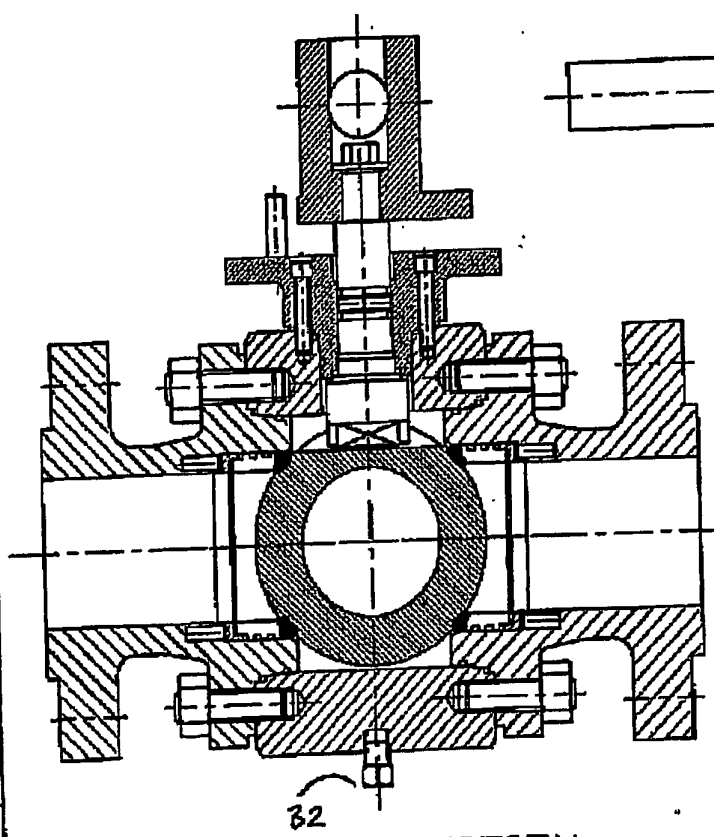
DIMENSIONS SHOWN ARE METRIC ☑ IMP ☐

PART NUMBERING
MATERIAL CODING

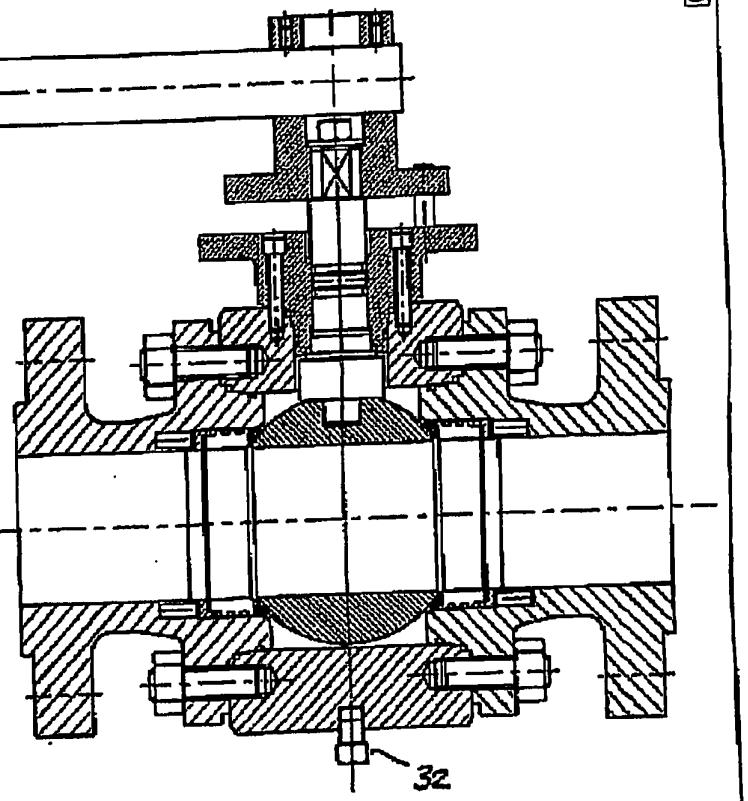
PART NUMBER	MATERIAL SPECIFICATION ✓		ITEM No
	BS970 GRADE 220M07 ea/L		
	BS2874 GRADE CZ121—BRASS		
	BS970 GRADE 316 S 11		
	BS970 GRADE 416 S 21.		
	MONEL 400.		
	INCOLOY 825.		
	ALI-BRONZE NES 853		
	HASTALLOY		
	CUPRO-NICKEL		

REVISIONS ⊕ 3rd angle

REV No	DATE	DETAILS OF CHANGE	INITIALISED
1	24/08/04	ISSUED	I.D.



CLOSED POSITION
Figure 3a



OPEN POSITION
Figure 3b

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

DIMENSIONS AND DESIGNS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

CERTIFICATION REQUIRED

BS EN 10204:(LATEST REVISION)

ORIGINAL MILL CERTIFICATE

N.A.C.E. MR. 01.75(LATEST REVISION)

ADDITIONAL:-

Alco Valves®
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713009 Int'l: ++44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE
PISTON SEAT FLOATING BALL
1/4" NPT CAVITY PORT

SCALE N.T.S.

DATE 24/08/04

DRAWING NUMBER

DRAWN DAC

CHECKED

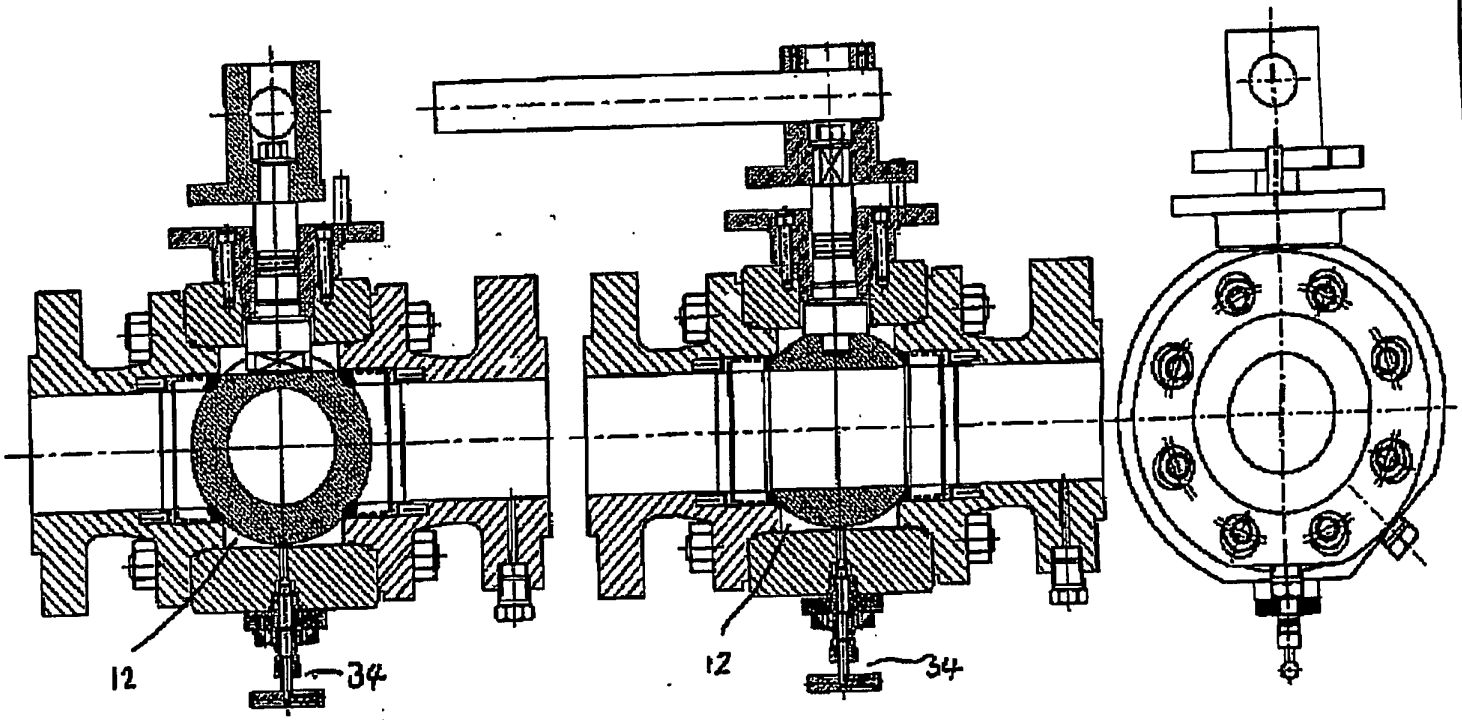
REVISION No 1

02/09/2004 16:13 BAILEY WALSH & CO → 01633814444 PAGE 001
01157672 02-Sep-04 05:46:1

PART NUMBERING MATERIAL CODING	THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY	CONFIDENTIAL	REMOVE ALL SHARP EDGES AND BURRS ☑	DIMENSIONS SHOWN ARE METRICS ☑ IMP ☐
			OUR PURCHASE ORDER No	

PART NUMBER	MATERIAL SPECIFICATION ✓		ITEM No
	BS970 GRADE 220M07 cs/l.		
	BS2874 GRADE CZ121-BRASS		
	BS970 GRADE 316 S 11		
	BS970 GRADE 416 S 21.		
	MONEL 400.		
	INCOLOY 825.		
	ALI-BRONZE NES 833		
	HASTALLOY		
	CUPRO-NICKEL		

BI-DIRECTIONAL CAVITY / DOWN STREAM PURGE OR BLEED PORT



FLOW →

CLOSED POSITION

Fig 4a

OPEN POSITION

Fig 4b

Fig 4c

REVISIONS ⊕ 3rd angle			
REV No	DATE	DETAILS OF CHANGE	INITIALISED
1	24/08/04	ISSUED	I.D.

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

DIMENSIONS AND DESIGNS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

CERTIFICATION REQUIRED
BS EN 10204:(LATEST REVISION)
ORIGINAL MILL CERTIFICATE
N.A.C.E. MR. 01.75(LATEST REVISION)
ADDITIONAL:-

Alco Valves®
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713008 Int'l: ++44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

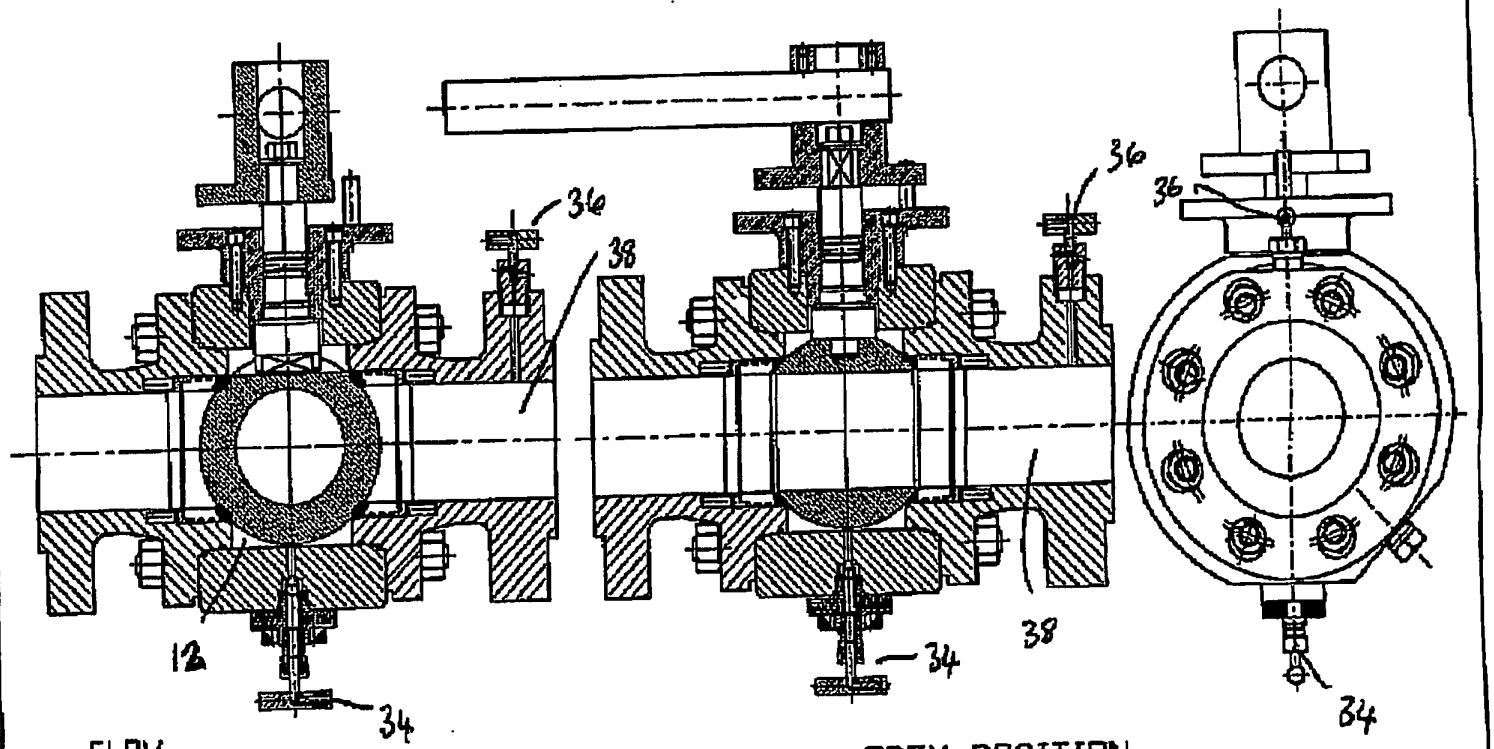
TITLE	SCALE N.T.S.
PISTON SEAT FLOATING BALL DOWN STREAM PURGE OR BLEED PORT CAVITY BLEED	DATE 24/08/04
DRAWING NUMBER . . . DRAWN DAC	CHECKED
REVISION No .	1

02/09/2004 16:13 BAILEY WALSH & CO → 01633614444

PART NUMBERING MATERIAL CODING	THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY	CONFIDENTIAL	REMOVE ALL SHARP EDGES AND BURRS ☑	DIMENSIONS SHOWN ARE METRIC ☑ IMP ☐
			OUR PURCHASE ORDER No	

PART NUMBER	MATERIAL SPECIFICATION ✓	ITEM No
	BS970 GRADE 220M07 cs/L	
	BS2874 GRADE CZ121-BRASS	
	BS970 GRADE 316 S 11	
	BS970 GRADE 416 S 21.	
	MONEL 400.	
	INCOLOY 825.	
	AL-BRONZE NES 833	
	HASTALLOY	
	CUPRO-NICKEL	

BI-DIRECTIONAL CAVITY / DOWN STREAM BLEED PORT WITH BLEED OR PURGE VALVE



FLOW →

CLOSED POSITION

Figure 5a

OPEN POSITION

Figure 5b

Figure 5c

REVISIONS ⊕ 3rd angle			
REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	24/08/04	ISSUED	I.D.

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

[redacted]NSIONS AND DESIGNS ARE [redacted]ECT TO CHANGE WITHOUT PRIOR NOTICE.

CERTIFICATION REQUIRED
BS EN 10204:(LATEST REVISION)
ORIGINAL MILL CERTIFICATE
N.A.C.E. MR. 01.75(LATEST REVISION)
ADDITIONAL:-

Alco Valves®
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713009 Intl: ++44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE	SCALE	N.T.S.
PISTON SEAT FLOATING BALL D-STREAM PORT, BLEED OR PURGE CAVITY BLEED	DATE	24/08/04
DRAWING NUMBER	DRAWN DAC	CHECKED
	REVISION No	1

01:15767 02-SEP-04 05:46
02/09/2004 16:13 BAILEY WALSH & CO LTD

PART NUMBERING
MATERIAL CODING

THIS DRAWING IS SUBJECT TO 'COPYRIGHT'
IT CANNOT BE COPIED OR REPRODUCED WITHOUT
THE WRITTEN AUTHORITY OF THE COMPANY

CONFIDENTIAL

REMOVE ALL SHARP EDGES AND BURRS ☑
OUR PURCHASE ORDER No

DIMENSIONS SHOWN ARE
METRIC ☑ IMP ☐

PART NUMBER	MATERIAL SPECIFICATION ✓		ITEM No
	65970 GRADE 220M07 ca/L.		
	BS2874 GRADE CZ121-BRASS		
	65970 GRADE 316 S 11		
	65970 GRADE 416 S 21.		
	MONEL 400.		
	INCOLOY 825.		
	AL-BRONZE MES 833		
	HASTALLOY		
	CUPRO-NICKEL		

BALL OR PISTON
CHECK VALVE DETAIL

UNI-DIRECTIONAL → CAVITY / DOWN STREAM VENTING

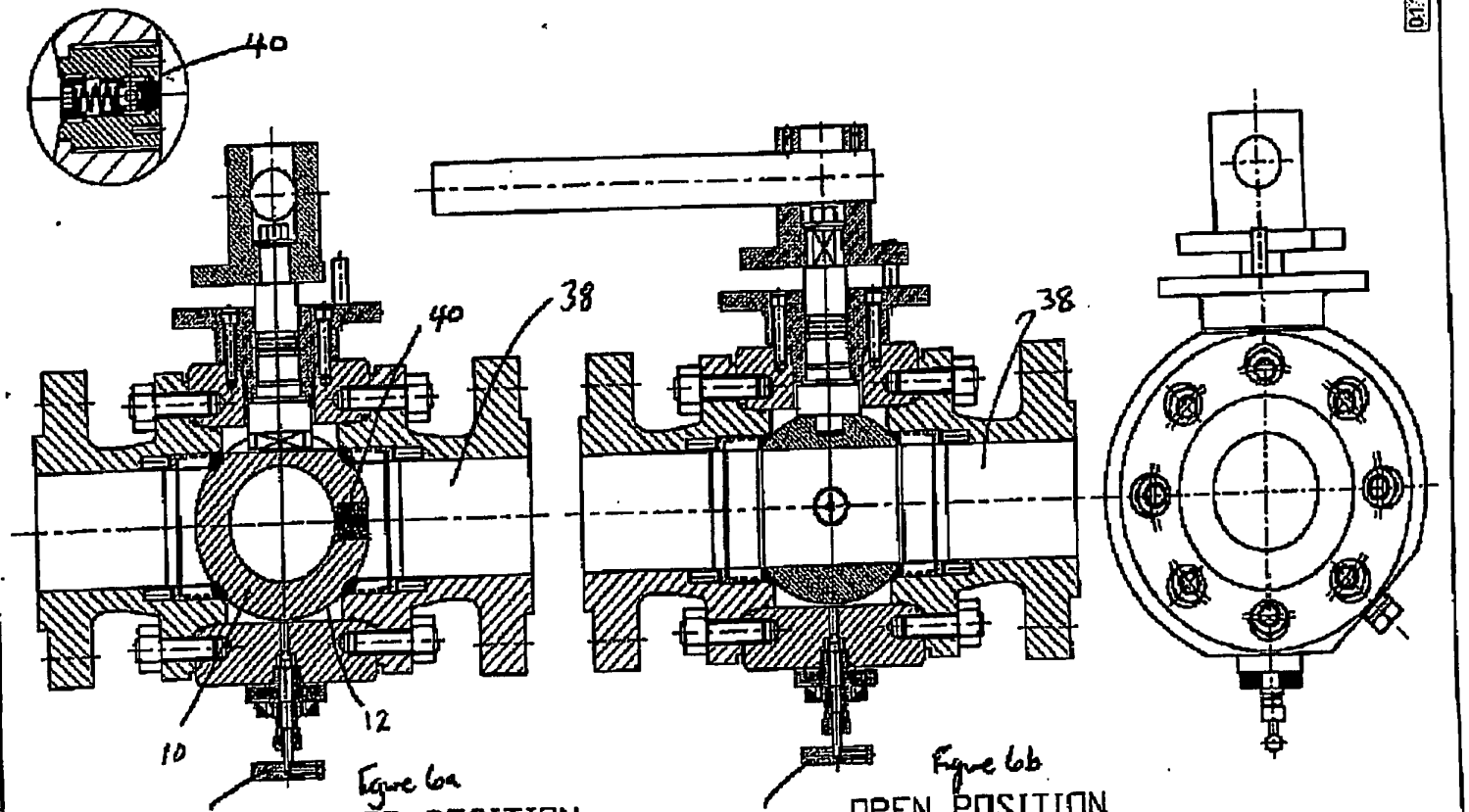


Figure 6a

FLOW →

CLOSED POSITION

UPON VENTING ALLOWS UPSTREAM PRESSURE TO OPEN CHECK VALVE AND BLEED

Figure 6b

OPEN POSITION

IN FULL OPEN FLOWING POSITION CAVITY ALONE CAN BE BLED OR SAMPLE TAKEN

Figure 6c

REVISIONS 3rd angle

REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	26/08/04	ISSUED	I.D.

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

DIMENSIONS AND DESIGNS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.

CERTIFICATION REQUIRED
BS EN 10204:(LATEST REVISION)
ORIGINAL MILL CERTIFICATE
N.A.C.E. MR. 01.75(LATEST REVISION)
ADDITIONAL:-

Alco Valves
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 719009 Intl: ++44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE
PISTON SEAT FLOATING BALL
UNI-DIRECTIONAL D-STREAM VENT
CAVITY VENT

SCALE N.T.S.
DATE 26/08/04
CHECKED

DRAWING NUMBER
DRAWN DAC
REVISION No 1

01576702 Sep 04 05:44
02/09/2004 16:13 BAILEY WALSH & CO 7 01604

PART NUMBERING MATERIAL CODING	THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY	CONFIDENTIAL	REMOVE ALL SHARP EDGES AND BURRS ☑	DIMENSIONS SHOWN ARE METRIC ☑ IMP ☐
			OUR PURCHASE ORDER No	

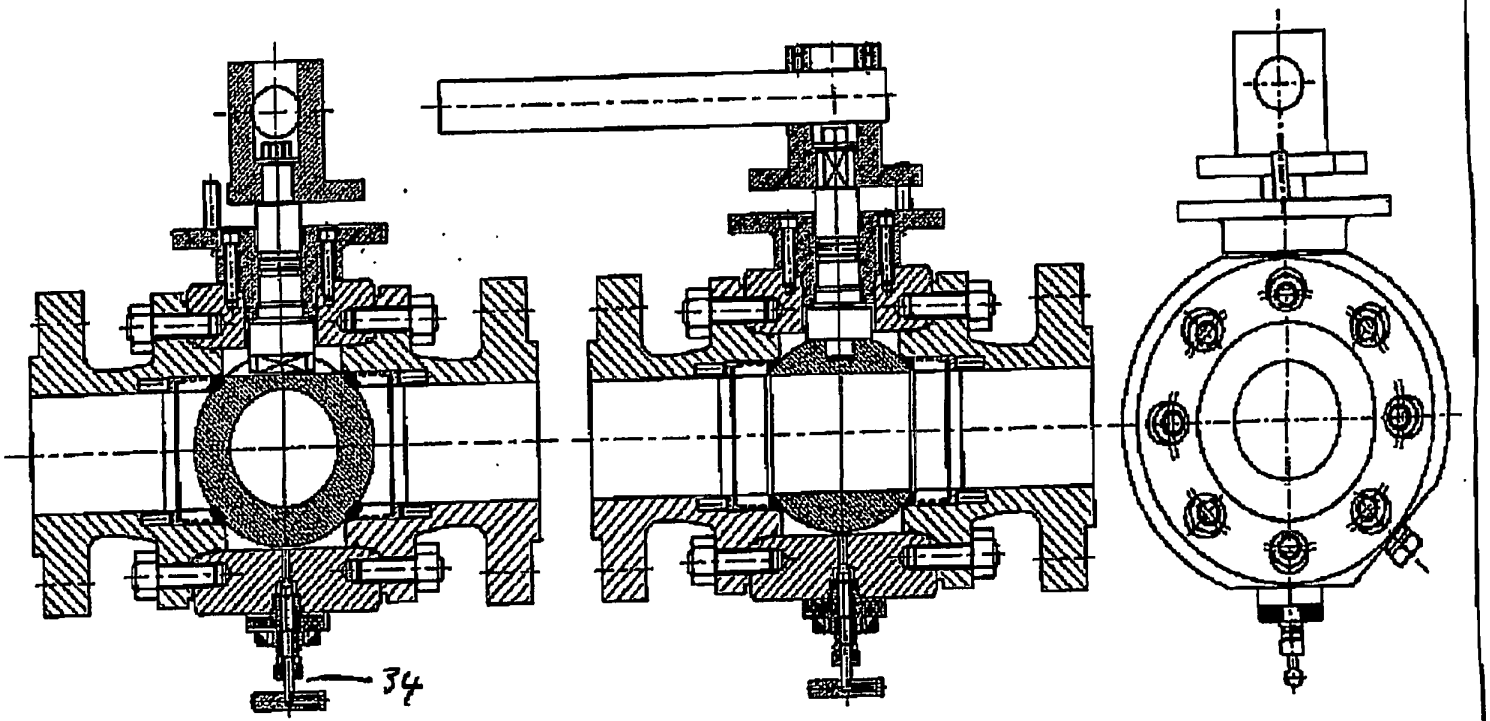
PART NUMBER	MATERIAL SPECIFICATION ✓	ITEM No
	BS970 GRADE 220M07 cs/L	
	BS2874 GRADE CZ121-BRASS	
	BS970 GRADE 316 S 11	
	BS970 GRADE 416 S 21.	
	MONEL 400.	
	INCOLOY 825.	
	ALI-BRONZE NES 535	
	HASTALLOY	
	CUPRO-NICKEL	

REVISIONS ⊕ 3rd angle			
REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	24/08/04	ISSUED	I.D.

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

[redacted]NSIONS AND DESIGNS ARE [redacted]JECT TO CHANGE WITHOUT PRIOR NOTICE.

bleed port



CLOSED POSITION — Figure 7a

OPEN POSITION — Figure 7b

Figure 7c

CERTIFICATION REQUIRED
BS EN 10204:(LATEST REVISION)
ORIGINAL MILL CERTIFICATE
N.A.C.E. MR. 01.75(LATEST REVISION)
ADDITIONAL:-

Alco Valves
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire, HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713009 Int'l: ++44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE	SCALE N.T.S.
PISTON SEAT FLOATING BALL CAVITY BLEED PORT	DATE 24/08/04
DRAWING NUMBER / DRAWN DAC	CHECKED
REVISION No 1	

02/09/2004 16:13 BAILEY WALSH & CO → 01633614444
0115767 02:SH 04:05:24

PART NUMBERING MATERIAL CODING

THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY

CONFIDENTIAL

REMOVE ALL SHARP EDGES AND BURRS ☑

OUR PURCHASE ORDER No

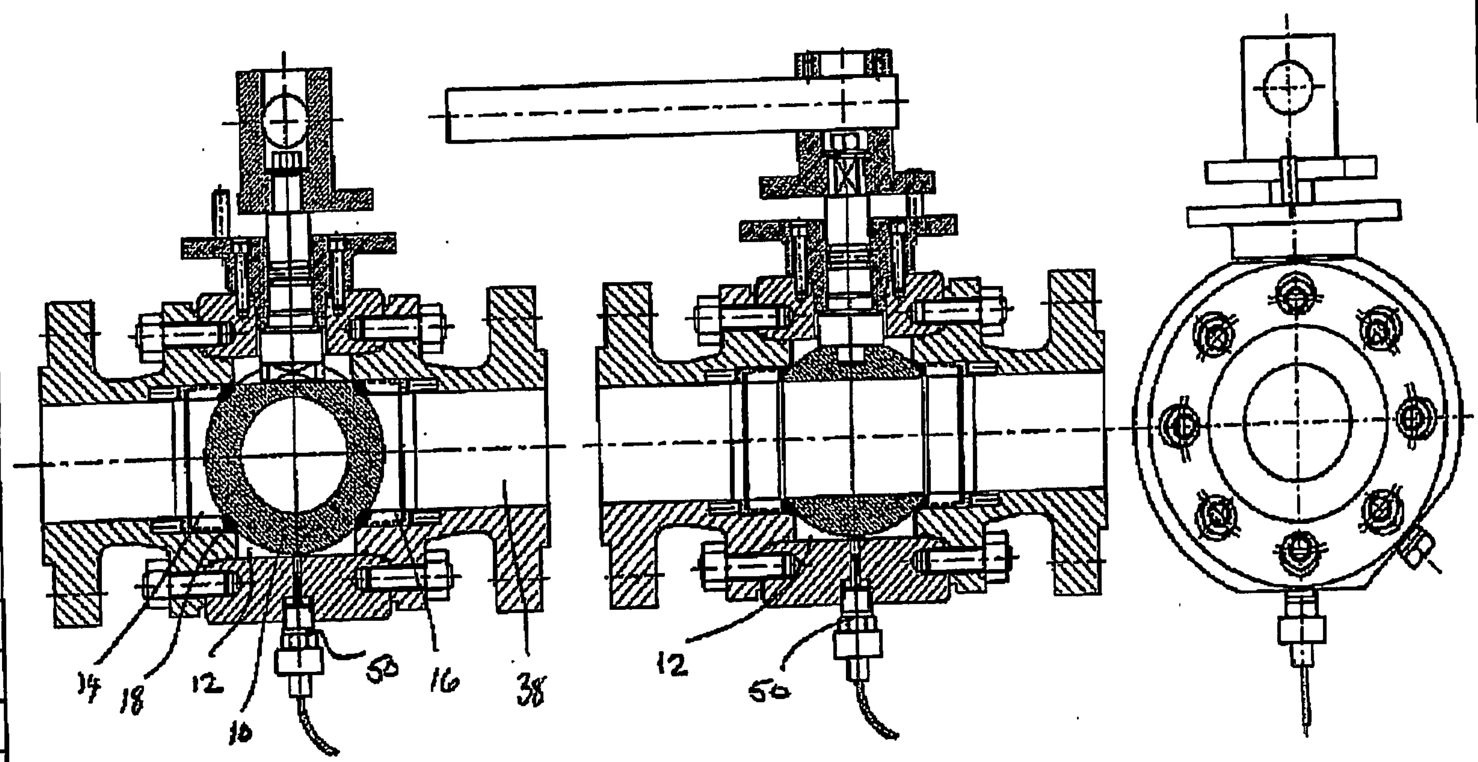
DIMENSIONS SHOWN ARE METRIC ☑ IMP ☐

PART NUMBER	MATERIAL SPECIFICATION ✓	ITEM No
	BS970 GRADE 220M07 en/L	
	BS2874 GRADE CZ121-BRASS	
	BS970 GRADE 316 S 11	
	BS970 GRADE 416 S 21.	
	MONEL 400.	
	INCOLOY 825.	
	AL-BRONZE NES 833	
	HASTALLOY	
	CUPRO-NICKEL	

REVISIONS

3rd angle

REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	24/08/04	ISSUED	I.D.



PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

...NSIONS AND DESIGNS ARE ...JECT TO CHANGE WITHOUT PRIOR NOTICE.

CERTIFICATION REQUIRED

BS EN 10204 (LATEST REVISION)

ORIGINAL MILL CERTIFICATE

N.A.C.E. NR. 01.75 (LATEST REVISION)

ADDITIONAL:-

Alco Valves
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713009 Intl: +44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE: PISTON SEAT FLOATING BALL CAVITY PRESSURE SENSOR

SCALE: N.T.S.

DATE: 24/08/04

DRAWING NUMBER

DRAWN: DAC

CHECKED

REVISION No: 1

0115767 02-Sep-04 05:46

PART NUMBERING MATERIAL CODING

THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY

CONFIDENTIAL

REMOVE ALL SHARP EDGES AND BURRS ☑

OUR PURCHASE ORDER No

DIMENSIONS SHOWN ARE METRIC☑ IMP ☐

0115767 02 Sep 04 05:46

PART NUMBER	MATERIAL SPECIFICATION ✓	ITEM No
	BS970 GRADE 220M07 cs/L	
	BS2874 GRADE CZ121-BRASS	
	BS970 GRADE 316 S 11	
	BS970 GRADE 416 S 21.	
	MONEL 400.	
	INCOLOY 825.	
	ALI-BRONZE NES 833	
	HASTALLOY	
	CUPRO-NICKEL	

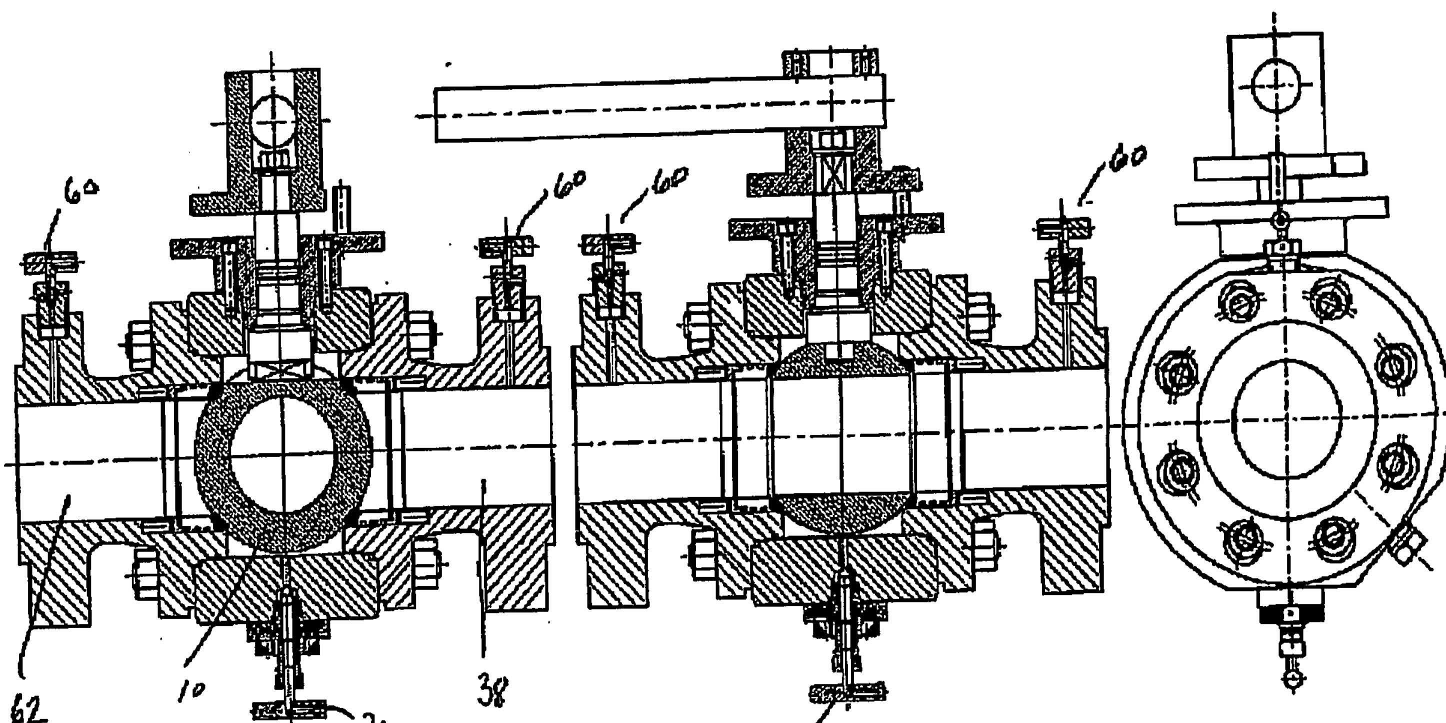
REVISIONS (3rd angle)

REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	24/08/04	ISSUED	I.D.

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

...NSIONS AND DESIGNS ARE ...JECT TO CHANGE WITHOUT PRIOR NOTICE.

BI-DIRECTIONAL CAVITY / UP & DOWN STREAM VENTING WITH BLEED OR PURGE VALVES



FLOW → CLOSED POSITION

Figure 9a

OPEN POSITION

Figure 9b

Figure 9c

CERTIFICATION REQUIRED

BS EN 10204:(LATEST REVISION)

ORIGINAL MILL CERTIFICATE

N.A.C.E. MR. 01.75(LATEST REVISION)

ADDITIONAL:-

Alco Valves
Industrial Valve Manufacturers
Mission Works, Birdsroyd lane, Brighouse, West Yorkshire, HD6 1LQ - UK
Tel: 01484 710511 FAX: 01484 713009 Intl: +44 1484 710511
Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE: PISTON SEAT FLOATING BALL UP & DOWN STREAM VENTING FLANGE BLEED OR PURGE VALVES CAVITY VENT

SCALE N.T.S.

DATE 24/08/04

DRAWING NUMBER

DRAWN DAC

CHECKED

REVISION No 1

PART NUMBERING MATERIAL CODING

THIS DRAWING IS SUBJECT TO 'COPYRIGHT' IT CANNOT BE COPIED OR REPRODUCED WITHOUT THE WRITTEN AUTHORITY OF THE COMPANY

CONFIDENTIAL

REMOVE ALL SHARP EDGES AND BURRS ☑

OUR PURCHASE ORDER No

DIMENSIONS SHOWN ARE METRIC ☑ IMP ☐

0115767 02 Sep 04 05:46

PART NUMBER	MATERIAL SPECIFICATION ✓		ITEM No
	BS970 GRADE 220M07 cs/f.		
	BS2874 GRADE CZ121-BRASS		
	BS970 GRADE 316 S 11		
	BS970 GRADE 416 S 21.		
	MONEL 400.		
	INCOLOY 825.		
	AL-BRONZE HES 833		
	HASTALLOY		
	CUPRO-NICKEL		

REVISIONS

3rd angle

REV No	DATE	DETAILS OF CHANGE	INTL RISED
1	24/08/04	ISSUED	I.D.

PRESSURE RATINGS ARE COLD WORKING, NON-SHOCK AND SUBJECT TO TEMPERATURE LIMITATIONS, UNLESS OTHERWISE STATED. PLEASE SEE SPECIFIC PRODUCT DATA.

…NSIONS AND DESIGNS ARE …JECT TO CHANGE WITHOUT PRIOR NOTICE.

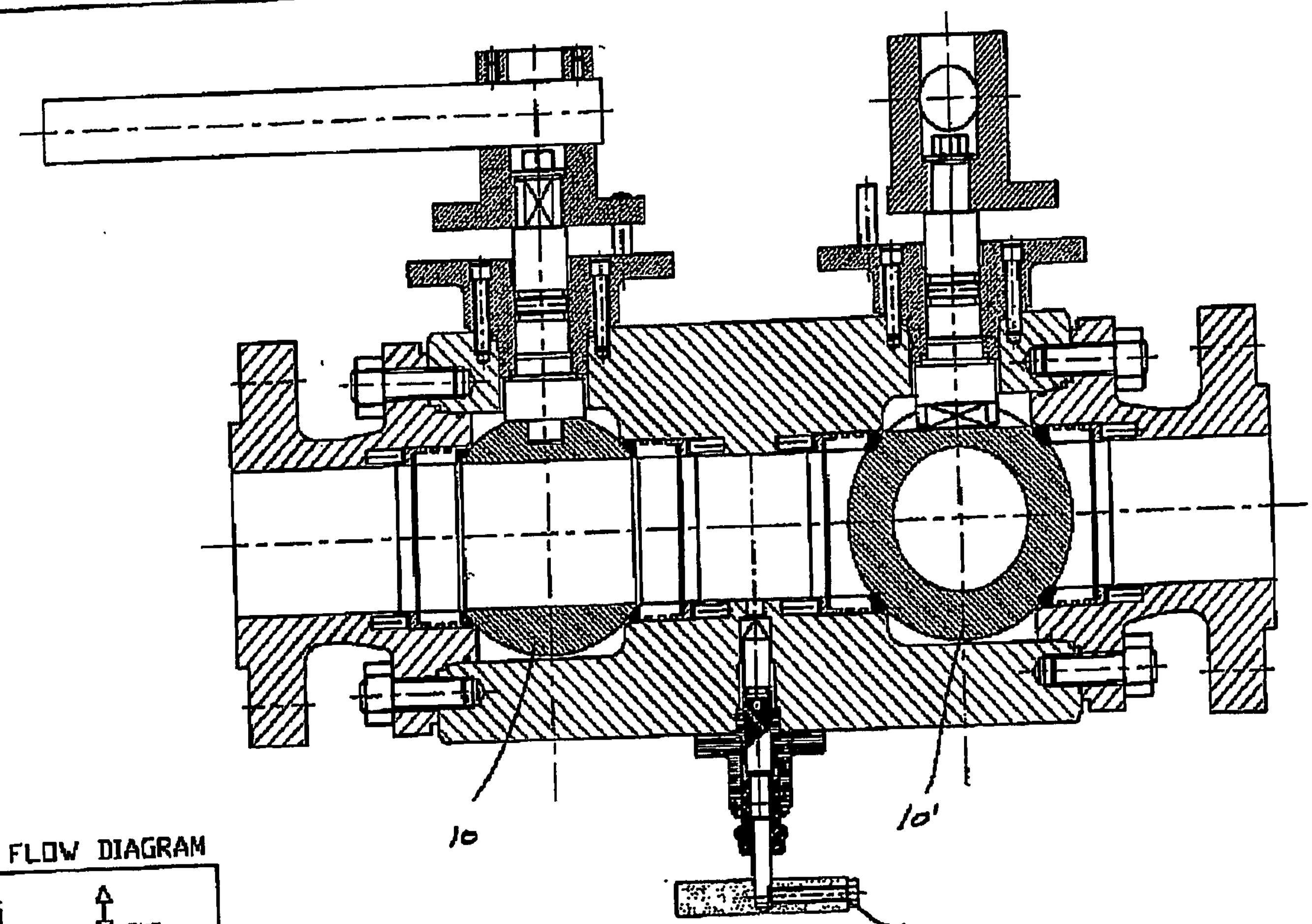
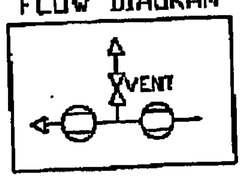


Figure 10.

FLOW DIAGRAM



CERTIFICATION REQUIRED
BS EN 10204:(LATEST REVISION)
ORIGINAL MILL CERTIFICATE
N.A.C.E. MR. 01.75(LATEST REVISION)
ADDITIONAL:-

Alco Valves Industrial Valve Manufacturers®

Misston Works, Birdsroyd lane, Brighouse, West Yorkshire. HD6 1LQ - UK

Tel: 01484 710511 FAX: 01484 713009 Int'l: +44 1484 710511

Website: www.alco-valves.com e-mail: uk@alco-valves.com

TITLE		SCALE N.T.S.
PROPOSED PISTON SEAT FLOATING BALL		DATE 24/08/04
DRAWING NUMBER	DRAWN DAC	CHECKED
	REVISION No	1

Document made available under the Patent Cooperation Treaty (PCT)

International application number: PCT/GB05/003385

International filing date: 01 September 2005 (01.09.2005)

Document type: Certified copy of priority document

Document details: Country/Office: GB
Number: 0419485.8
Filing date: 02 September 2004 (02.09.2004)

Date of receipt at the International Bureau: 17 October 2005 (17.10.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

World Intellectual Property Organization (WIPO) - Geneva, Switzerland
Organisation Mondiale de la Propriété Intellectuelle (OMPI) - Genève, Suisse